

Off-flavor Remediation from RAS-produced Atlantic salmon: Research at the Freshwater Institute



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- Standard for purging off-flavor from RAS-produced salmonids (Burr et al., 2012)
- Atlantic salmon required 10-15 days of purging in odor-free flow-through or clean RAS
 - Extended depuration resulted in weight loss, reduced fillet color, and lower lipid levels

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Impact of depuration of earthy-musty off-flavors on fillet quality of Atlantic salmon, *Salmo salar*, cultured in a recirculating aquaculture system

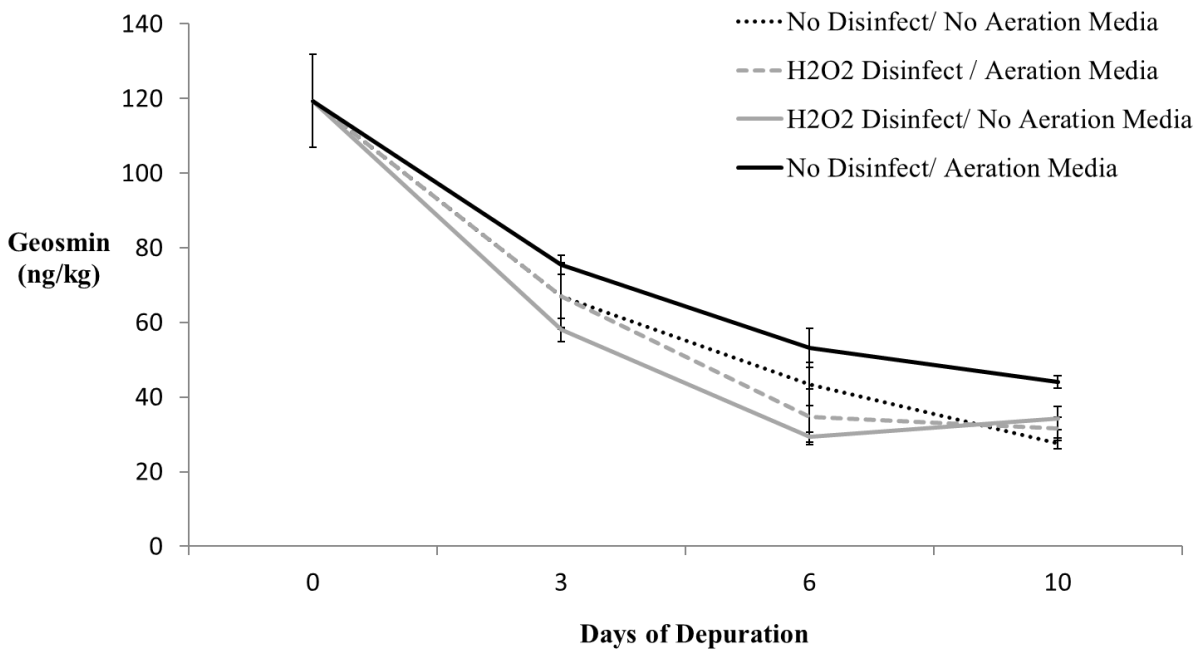
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- Davidson et al., 2014. Evaluating depuration procedures to mitigate the off-flavor compounds geosmin and MIB
 - Coauthors – Jennifer Aalhus, Manuel Juarez, Eric Ruan, Bruce Swift, Kevin Schrader, Bill Wolters, Gary Burr, Steven Summerfelt, Christopher Good
- Off-flavor remediation is improved when purge systems are:
 - Cleaned and disinfected with H₂O₂ prior to stocking
 - Free of high surface area media





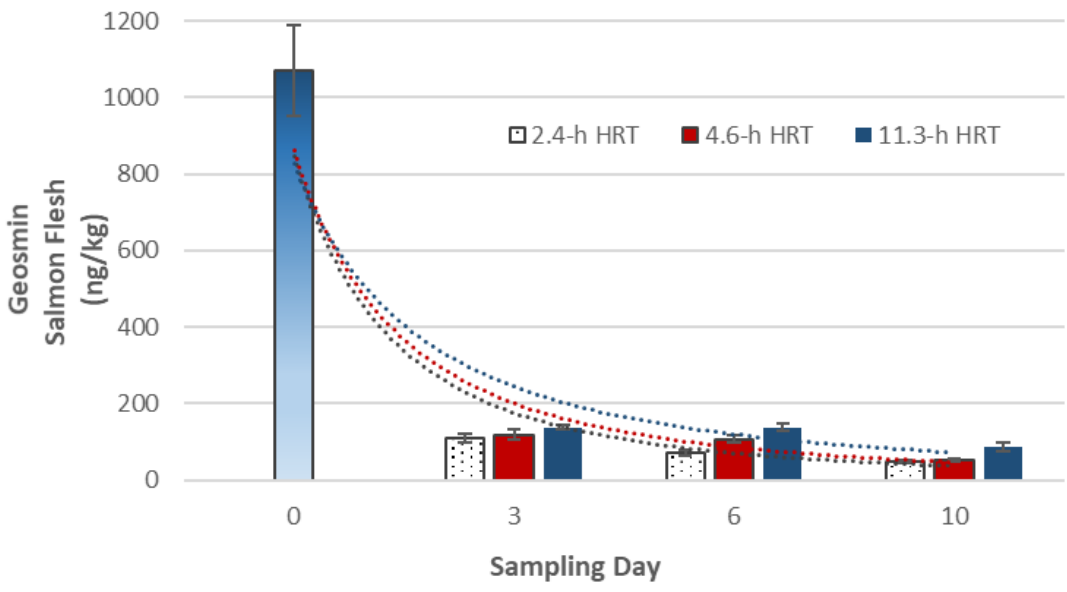
➤ Effect of flushing rate/ hydraulic retention time (HRT) on off-flavor removal from market-size Atlantic salmon

- Compare geosmin levels in purge systems operated with 2.4, 4.6, and 11.3-h HRT
- Coauthors – Casey Grimm, Gregory Fischer, Steven Summerfelt & Christopher Good



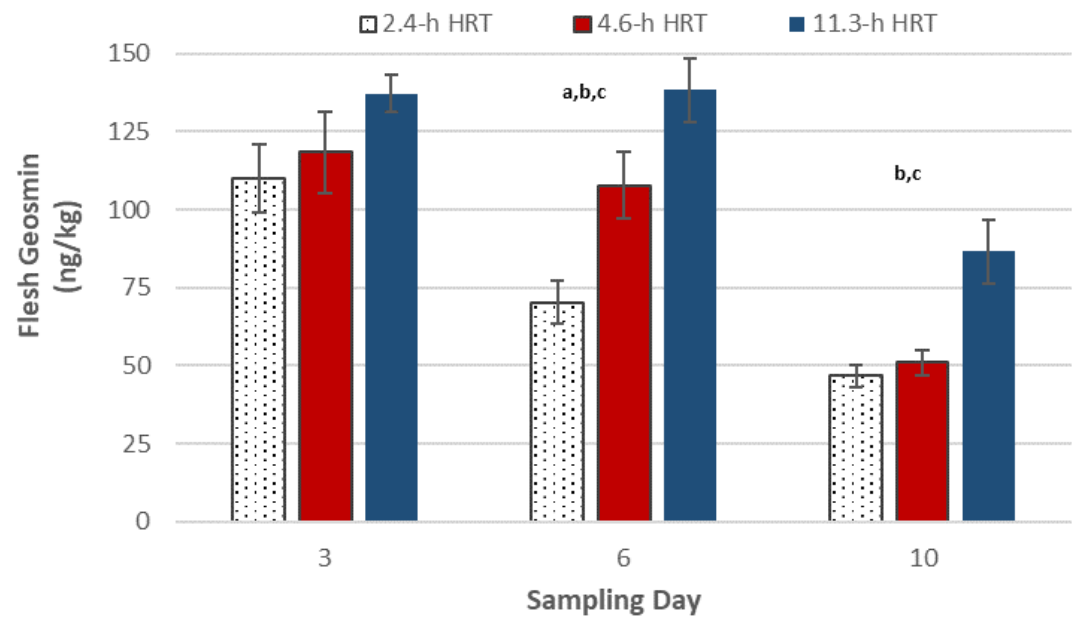
➤ Effect of variables that influence Atlantic salmon metabolism:

- 2 x 2 factorial study
- Dissolved Oxygen Concentration
- Fish Swimming Speed



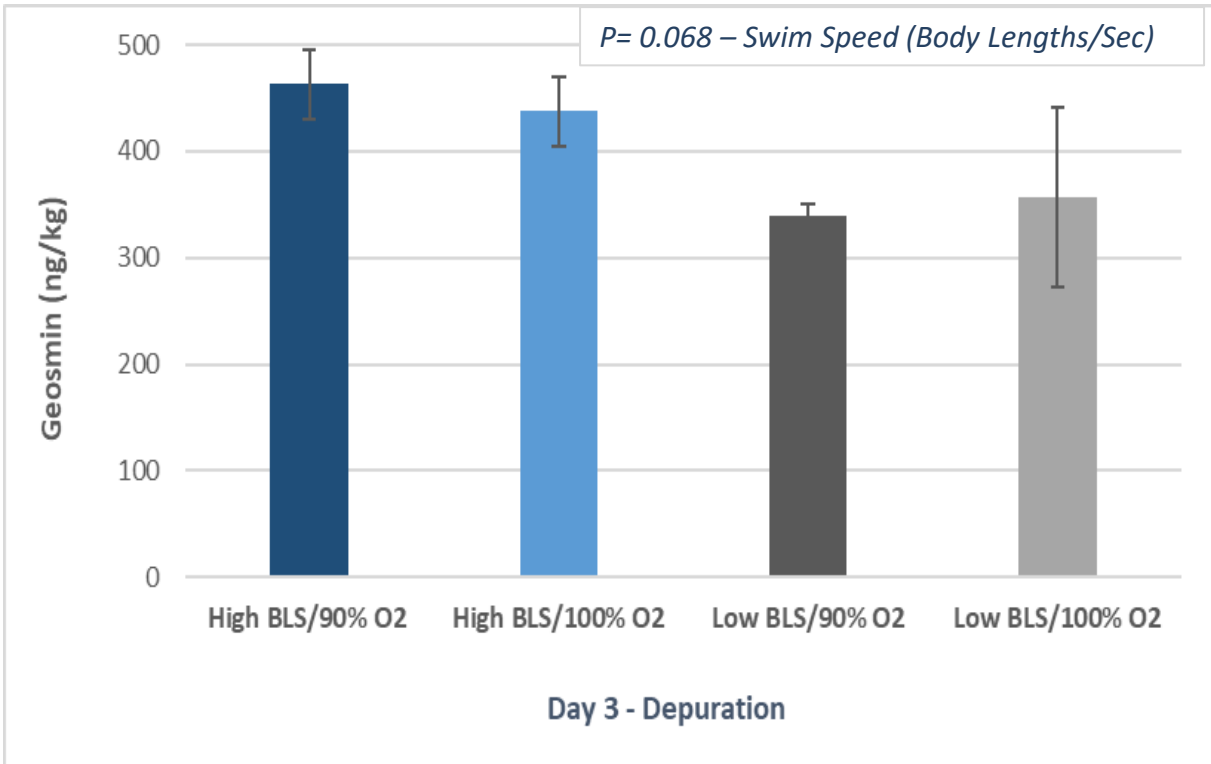
- Geosmin was greater with increasing HRT on Day 6
- Higher geosmin in salmon flesh for the 11.3-h HRT on Day 10

- Fish from all treatments purged and were likely “on-flavor” by Day 10
- Depending on sensory threshold, salmon may have effectively purged by Day 3
 - Water temperature = 14.2-15.6 °C



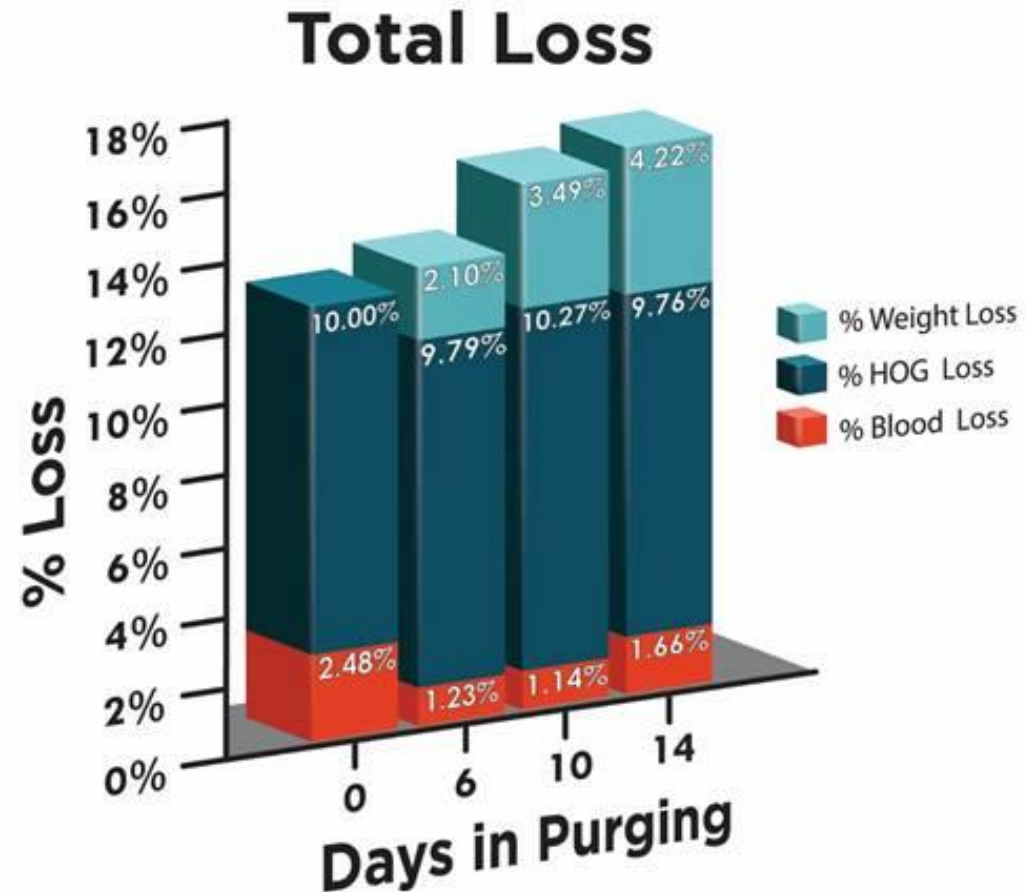
- Complete laboratory sampling and data analysis pending due to COVID-19
- Difficult to achieve rapid swimming velocities ≥ 1 bls
- Initial results indicate a borderline effect of swimming speed
- Unexpected trend - forced ram ventilation appears to reduce geosmin

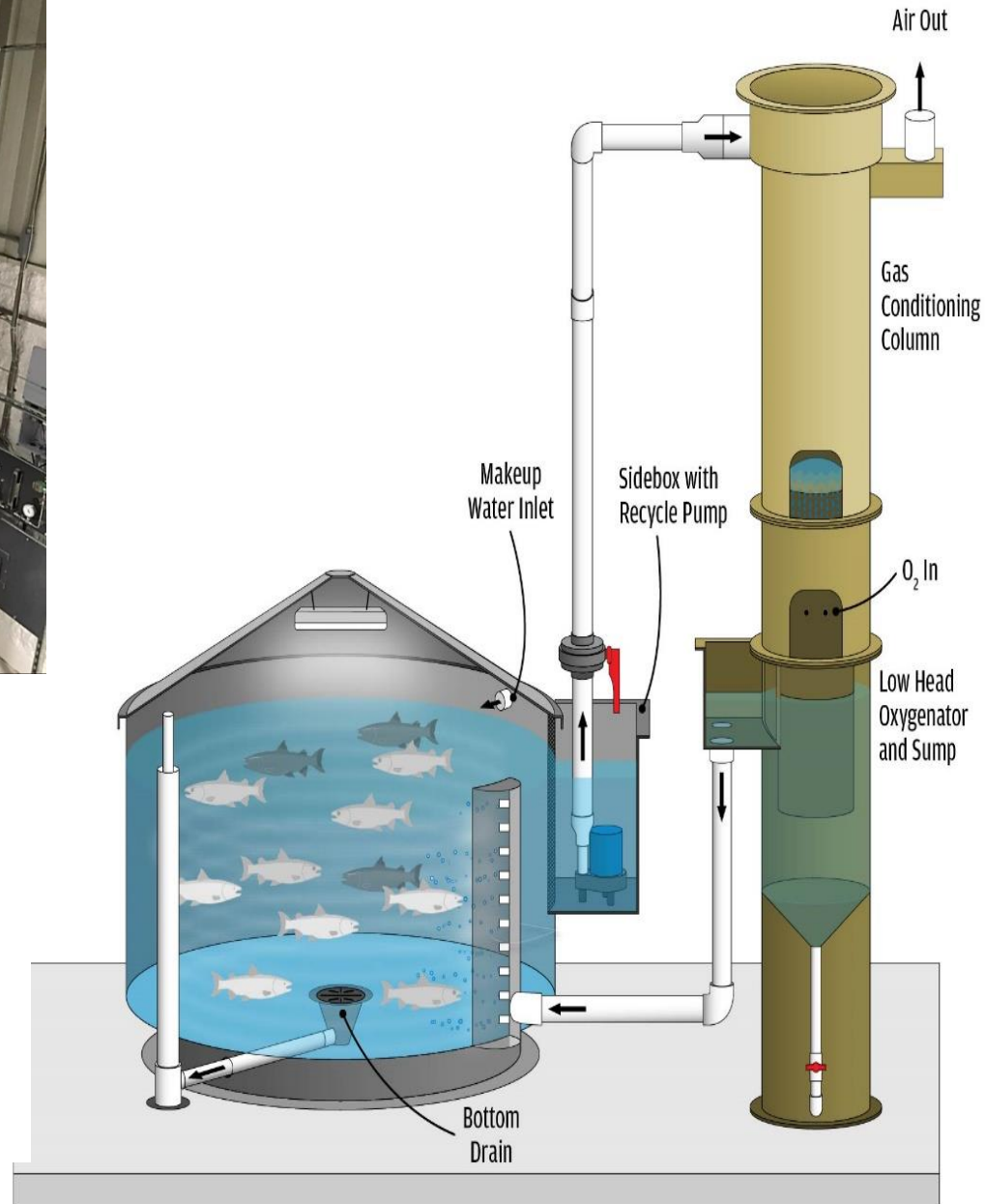
Swimming Speed (body lengths/sec)	0.6	0.3
Dissolved Oxygen (% Saturation)	100	90



➤ Recent FI research indicates that market-size Atlantic salmon lose weight from the HOG carcass with extended depuration

- Blood loss and visceral loss were relatively neutral
- Unexplained loss Days 6-10
- fillet lipid, protein, or moisture
- Loss could equate to millions (\$) at commercial scale





- Partial reuse system
 - powerwash, cleaned, H₂O₂ disinfected
- Stacked gas conditioning column
 - void of media
- ~ 3-hr system hydraulic retention time
- 6-day purge while withholding feed

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- The Conservation Fund, USDA-ARS, and U.S. Department of Commerce/NOAA are equal opportunity employers and providers.
- Opinions, conclusions, and recommendations are the authors and do not necessarily reflect views of the funding bodies.
- Experimental protocols complied with the Animal Welfare Act (9CFR) and were approved by the Freshwater Institute's Animal Care and Use Committee.
- Special thanks to Natalie Redman, Megan Murray, and Destiny Evy for water sample collection and water chemistry analyses, to Shanen Cogan and JC Stanley for operations assistance, to Kata Sharrer for engineering drawings and photography.

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